

Additively Manufactured Monolithic Catalyst Bed for Green Propellants, Phase I

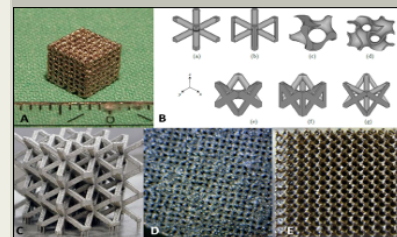
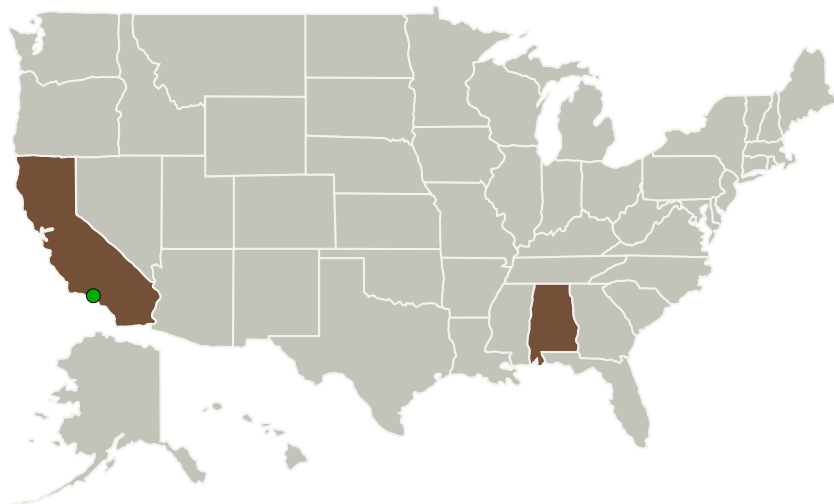
Completed Technology Project (2016 - 2016)



Project Introduction

This proposal aims to develop a low cost, high efficiency catalyst technology to address navigation and maneuver difficulties in NASA's return missions. Our approach takes advantage of two recent innovations in the space industry regarding green monopropellants and additive manufacturing (AM). In the proposed project, we are to design and fabricate a monolithic catalyst bed using selective laser melting (SLM) technology and begin to optimize its catalytic performance with new green monopropellants like AF-M315E and LMP-103S. The overwhelming advances that these two areas have seen in the last few years are making it possible to offer a novel solution to the problems that robotic exploration missions are currently facing. Our proposed solution will enhance thruster life, decrease the risk of catalyst bed failure, and lower the cost of green monopropellant subsystems used in small spacecraft. Our proposed project has two main objectives. First, we will demonstrate the additive manufacture of a monolithic W-Re catalyst substrate that combines high flow area and high internal surface area, to insure high reactivity and low pressure drop. Then, we will begin to develop a thorough understanding of the HAN and ADN chemical behavior at a molecular level, in order to precisely tailor the Ir/Pt/Re catalyst material formulation for maximum catalytic reactivity.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
ASRC Federal Astronautics, LLC	Lead Organization	Industry	Huntsville, Alabama
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
Alabama	California

Project Transitions

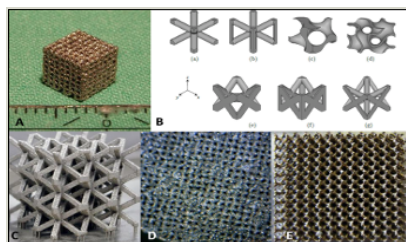
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

Closeout Documentation:

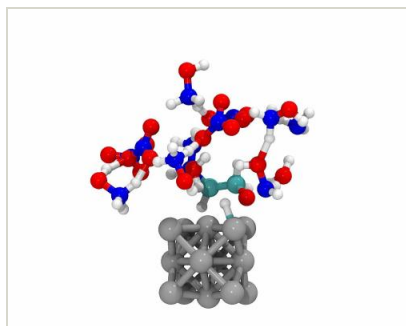
- Final Summary Chart(<https://techport.nasa.gov/file/139593>)

Images



Briefing Chart Image

Additively Manufactured Monolithic Catalyst Bed for Green Propellants, Phase I
(<https://techport.nasa.gov/image/127269>)



Final Summary Chart Image

Additively Manufactured Monolithic Catalyst Bed for Green Propellants, Phase I Project Image
(<https://techport.nasa.gov/image/126128>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ASRC Federal Astronautics, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

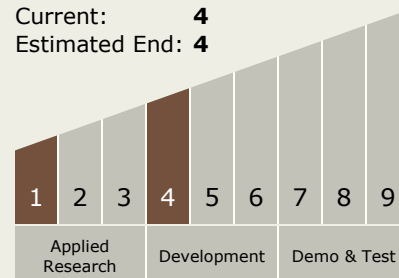
Carlos Torrez

Principal Investigator:

Junia Melin

Technology Maturity (TRL)

Start: 1
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.1 Chemical Space Propulsion
 - └ TX01.1.2 Earth Storable

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System